

vary considerably. It is probable that there is a striking variation in the strength of the hereditary tendency to unilateral cerebral dominance and that this may be either a very strong tendency to dominance of the left hemisphere, or of the right hemisphere, with variable grading between. Orton has expressed this idea: "The occurrence of a group of children who exhibit little bent toward either the right- or left-hand pattern in spite of the usual exposure to training, and of another group who start with a slight preference for the left but even with the most moderate pressure are led to shift to the right, is, we believe, strong evidence that this group of mixed, crossed, and undecided patterns indicates the presence of an inherent variable here, and our findings in this selected group of children seem to be explicable only on the existence of a graded series of sidedness preference, extending all the way from very strongly right-sided individuals to very strongly left-sided ones, and with all degrees of intermingling in between. This is what might be anticipated as the result of intergrading between two genetic factors leading respectively to left- and right-sidedness." Usually the dominance is for the entire hemisphere, but occasionally the major occipital lobe may be contralateral.

It is possible to modify greatly any individual's inherited tendencies by training so that a left-brained person may be converted into a right-brained individual. The age at which this training takes place and, of course, the intensity of the training, have a great deal to do with this transference of dominance.

It is a well-known fact that organic lesions of the major hemisphere in children cause very little, if any, disturbance of language function. This is probably due to the fact that dominance in children is practically limited to motor functions and that unilateral dominance as regards language function has not yet been developed or reinforced by training. By systematic training it is possible to transfer the dominance of the portion of the brain concerned with specific language functions from one side to the other in many individuals up to the age of ten or twelve years.<sup>9</sup> After this age considerable transfer is possible, but it is never so complete.<sup>8</sup> Thus, aphasic manifestations due to cerebral lesions in children are very mild and transient, while those in adults are permanent to some degree.

The variability in hereditary factors leading to unilateral cerebral dominance, and the great variation in training to which each individual is subjected, explain, to a large degree, the variation in symptoms due to specific lesions of the so-called language centers. These are obviously due to the inherent capacities of the right hemisphere in language function. In many cases improvement has been noted in adults after a destructive lesion of the major cortex. Might this not be explained by a strengthening of these inherited neurograms by the process of neurobiotaxis?

#### IN CONCLUSION

Unilateral cerebral dominance is an inherent trait characteristic of man. The tendency to left-

brainedness or right-handedness may be a dominant hereditary factor in the Mendelian sense.

Training tends to reinforce and even increase this tendency. Systematic and persistent training directed so as to develop the inherent capacities of the minor hemisphere may result in a transference of dominance to this hemisphere if applied early in life. Systematic training in the adult, with aphasia due to an organic lesion of the brain, may give improvement as a result of reinforcing the inherent capacities of the minor hemisphere, but not to the degree possible in children.

The theory of neurobiotaxis, as developed by Kappers, appears to be of great significance in explaining the above phenomena.

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#### GALL-BLADDER: ITS RELATION TO CHRONIC ARTHRITIS OF UNCERTAIN ETIOLOGY\*

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THE part the biliary tract plays as a direct or indirect factor in the problem of chronic arthritis has been given little consideration. The literature on the subject is remarkable for its paucity. It is reported, usually, from the surgical point of view, as another area of focal infection.<sup>1</sup>

The liver and its appendage, the gall-bladder, plays a complex rôle in the well-being of a normal individual. We know chronic arthritis is a generalized, systemic disease which mirrors its effect in all systems by a physiologic depression or modification of function. Therefore, I feel we have cause to inquire into the relationship of a patient suffering from chronic arthritis of uncertain origin and gall-bladder function.

In this study, the ordinary type of gall-bladder visualization test was used. Its limitations are appreciated and the factors that modify it were con-

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sidered on reading the films. However, if properly interpreted, it is a generally accepted measure.

Beilin, in a publication this year, concluded: "Cholecystography has proved the most valuable examination in a diagnosis of gall-bladder disease."<sup>2</sup>

#### TEST PROCEDURE

This type of test is available in most localities. Sodium tetraiodophenolphthalein was administered in the usual, accepted manner; that is, four grams orally of the soluble iodophthalein the evening preceding the x-ray study. The patient's preparation, reception, and care are of common routine in the ordinary roentgenologic practice.

#### CLINICAL MATERIAL FOR THE STUDY

The subjects used in this test are broadly classified as chronic arthritides of unknown etiology. Excluded were the arthralgias and those cases that were accompanied by gout, gonorrhea, syphilis, or any other specific infection. The patients were not selected, but were studied as they appeared in the arthritis clinic in the ordinary course of events. All x-rays in this series were read by the same roentgenologist.

These seventy-one cases were accumulated over a year's time, and the presence of the disease existed in every one of them over a period of six months; while, in the majority, the disease had been present for years.

In dividing the group according to sexes, we find the female predominating at a ratio of four to one; that is, fifty-eight females and thirteen males. This ratio is not out of keeping with statistics concerning cholecystitis and arthritis, in which there is a preponderance of females.

#### CLASSIFICATIONS

The classification of arthritis used in this series is as follows:

In the group known as Type I, I have included all those who are otherwise known clinically as atrophic or infectious, pathologically as proliferative, and by the English as rheumatoid.

In the group known as Type II, I have included those clinically known as hypertrophic, pathologically as degenerative, and with the English terminology, osteo-arthritis.

In the group known as Type III, I have included all those cases which present a mixture of the above two types with, usually, one or the other type predominating in the clinical picture.

*Age Groupings.*—Dividing these patients up into age groupings, we find they distribute themselves as follows:

- Between the years 20 to 30— 2 patients.
- Between the years 20 to 40— 9 patients.
- Between the years 40 to 50—17 patients.
- Between the years 50 to 60—24 patients.
- Between the years 60 to 70— 9 patients.
- Between the years 70 to 80— 5 patients.

The oldest patient was a woman of seventy-nine years, who was classified as Type II, and the youngest was a male, twenty-six years of age, classified as Type I.

Dividing these patients into groups according to the classification given above, their distribution is relatively equal. That is, there are twenty-five cases in Type I, twenty-one cases in Type II, and twenty-five cases in Type III.

*Complications.*—The most common complication in the treatment was that clinical syndrome, menopause. It is also significant that "underweight" was the complication in only one case, while adiposity or definite excess weight was a complication in fourteen cases. One patient had mild diabetes. The other complications are of no great moment, and are common complications in the late-age groups such as we are dealing with.

#### FINDINGS WITH THE DYE TEST

In reviewing the seventy-one cases in this report, in relation to the function of the gall-bladder as measured by the dye test, we find it as follows:

*Twenty-five patients gave a normal x-ray finding.*

Ten patients, on examination and questioning, gave no gastro-intestinal complaints nor findings.

Fifteen patients complained of one or more of the usual symptoms of low-grade indigestion, such as belching, bloating, flatulence, or constipation.

*Forty-six patients were reported with pathologic findings on x-ray visualization.* That is, they were reported with stones, or no visualization, or there was a marked variation noted as to filling, concentration, or emptying, from the accepted normal.

Four of the forty-six patients were reported as having gall-stones. One of these four patients had a negative clinical history.

Six patients were reported as having no visualization of the gall-bladder. Three of these six patients whose gall-bladders did not react to the dye had a negative clinical history.

The remaining thirty-six patients who presented *atypical findings* showed twelve who had negative clinical histories in relation to their gastro-intestinal tracts. These clinical histories are not out of keeping with a report of 1926 of 612 routine post-mortem examinations. Here evidence of cholecystitis was found in 66 per cent of the cases in which only 8 per cent had a primary diagnosis of cholecystitis.

Those reported as having pathologic findings were subdivided according to age:

- 20 to 30 years— 1 out of 2 patients.
- 30 to 40 years— 7 out of 9 patients.
- 40 to 50 years— 9 out of 17 patients.
- 50 to 60 years—15 out of 29 patients.
- 60 to 70 years— 9 out of 9 patients.
- 70 to 80 years— 5 out of 5 patients.

The twenty-five patients reported with *normal x-ray findings* were grouped:

- 12 were in Group I (rheumatoid).
- 8 were in Group II (osteo-arthritis).
- 5 were in Group III (mixed type).

The forty-six patients reported with *positive findings* were classified:

- 13 were in Group I.
- 13 were in Group II.
- 20 were in Group III.

## COMMENT

Seventy-one patients of arthritis were studied by the common method of x-ray visualization and divided themselves equally in the usual groups this disease tends to gravitate into when definitely established.

Sixty-four per cent of the patients were in the age group of 50 to 60 years.

Eighty-one per cent of the patients were female.

In a group of seventy-one patients, 64 per cent gave positive findings on x-ray study.

Sixteen, or 34.8 per cent, of the forty-six patients reported positive, gave a negative clinical history in relation to direct symptomatology from the gastro-intestinal system. This is where I feel the conclusions of the much-quoted article by Hartung and Steinbroker were in error. They selected thirty cases out of two hundred for study on the basis of positive history or physical findings; hence their conclusion, that the instance of pathology was the same as in the ordinary run of general medical admissions.<sup>4</sup>

In forty-six cases reported positive:

28.3 per cent were in Group I (rheumatoid).

28.3 per cent were in Group II (osteo-arthritis).

43.4 per cent were in Group III (mixed).

## IN CONCLUSION

Insufficiency of the gall-bladder is a frequent occurrence in the rheumatic syndrome.

Gall-bladder visualization, by the ordinary, accepted x-ray procedure, should be available in each diagnostic study of the treatment and supportive care of all individuals suffering from chronic arthritis of uncertain etiology.

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## ENDONASAL TEAR SAC OPERATION\*

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**S**URGICAL procedures for the relief of dacryocystitis, and of epiphora caused by an obstruction in the lacrimal system, are not new in the history of medicine. Galen leaves a record of an attempt to restore the flow of tears through the nose by boring a hole through the lacrimal bone, following this with the use of cautery to produce a fistula. And, lest we be too impressed with the progress of medicine, procedures not too far removed from Galen's are in use at present in certain hands, with the same intention.

Before proceeding to a consideration of what has been attempted in tear-sac surgery, and of what can

be expected from these various maneuvers, it is well to review briefly the anatomy of the region in question.

## ANATOMY OF THE REGION

The bony fossa containing the lacrimal sac is made up of the lacrimal bone, which is comparatively thin, and the posterior lip of the ascending process of the superior maxilla, which is comparatively thick and, at times, formidably so. The bony fossa containing the lacrimal duct is made up of the same two elements, together with a small process from the inferior turbinate at its lower part. The component parts of the membranous lacrimal apparatus are the puncta, the canaliculi, the sac and the duct. Because of its importance in any consideration of an external operation, mention should be made of the fact that the punctum is imbedded in, and the canaliculus runs through, the orbicularis muscle. And, because of its importance in any consideration of an endonasal or an external operation, mention should also be made of the fact that anterior ethmoid cells, a marked deviation of the nasal septum, enlargement of the anterior tip of the middle turbinate, and even abnormalities of the inferior turbinate, may affect the lacrimal apparatus. The inferior turbinate is seldom mentioned in a discussion of this question; but in one case, which was referred to me for an endonasal tear sac operation for the relief of epiphora, examination of the nose revealed the presence of polypoid changes along the inferior and lateral aspects of the inferior turbinate. Removal caused a complete cessation of the tearing, without additional surgery.

## PHYSIOLOGY AND PATHOLOGY

In view of the almost universal agreement that the physiology of tear removal from the eye depends chiefly on the muscle action about the canaliculus, it would seem that slitting of the puncta should be dispensed with entirely, although, unfortunately, it is still occasionally done, with the almost invariable result that any subsequent attempt to relieve tearing is futile.

The pathological course of the production of chronic dacryocystitis is briefly as follows: obstruction—usually a result of pathological changes in the adjacent ethmoid cells, antrum, or turbinates—is followed by stagnation of secretion which offers a good field for the growth of bacteria, swelling of the mucous membrane and necrosis of the epithelium, with the subsequent formation of adhesions.

## DIAGNOSIS

The diagnosis of obstruction can be made when a reasonable number of attempts to irrigate the sac with the proper solutions fail to bring the fluid into the nose. Gentle dilatation of the puncta to permit of easy introduction of the tip of the irrigating syringe is permissible, but forcible probing is to be warned against. A further point of diagnosis, however, is most important, *i. e.*, the determination of the site of the obstruction, for if it occurs between the puncta and the sac, obviously no procedure intending to establish a new passageway for the emptying of tears from the sac into the nose will be successful. If this point cannot be settled other-

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